

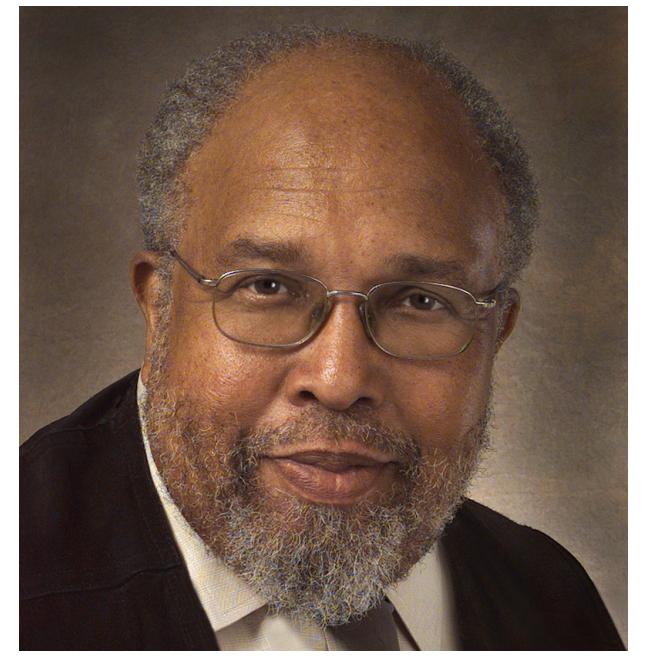
Searching for Black Women in Mathematics

Natasha Arnold (Cal Poly Pomona), Tianna Couch (Pomona College), Brandon Douglas (Cal Poly Pomona),
 Tadius Frank (Pomona College), and Christina Marsh (Pomona College)
 MADDER: Mathematicians of the African Diaspora Database's Ensemble of Researchers

Abstract

Historically, Black women are underrepresented in the field of mathematics. While the achievements of some Black female mathematicians have been celebrated in popular culture, many of their accomplishments have gone unrecognized. Through teaching, research, collaboration, and mentorship the contributions of Black female mathematicians should be honored and celebrated. This project revisits archives and databases to compile a comprehensive list of Black female Ph.D.s in mathematics through history. This list is part of an ongoing project tracking and documenting the contributions of mathematicians of the African diaspora. Through this project, we hope to highlight the resilience and unique stories of Black women in academia.

Mathematicians of the African Diaspora (MAD Pages)



Scott W. Williams

The screenshot shows the homepage of the Mathematicians of the African Diaspora website. It features a header with the title "Mathematicians of the African Diaspora" and links to "Frances Sullivan January 8, 1944 - December 14, 2007", "John A. Ewell February 28, 1928 - July 21, 2007", and "CAARMS 14: Conference for African American Researchers in the Mathematical Sciences July 22-27, 2008". Below the header is a navigation menu with sections like "CONTENTS", "The Greatest Black Mathematicians", "Black Research Mathematicians & their Books", "A MODERN HISTORY OF BLACKS IN MATHEMATICS", "THE ANCIENTS in Africa", "Black and Worldly", "WORLD Organizations", "Black Mathematicians & Journals", "Computer Scientists", "NEW Ph.D.s", "Ph.D.s", "FOR OPENINGS", "MODER References", and "ACKNOWLEDGEMENTS". The main content area displays a grid of profiles for various mathematicians, with one profile for Etta Zuber Falconer highlighted.

Williams introduced the site in 1997. There are more than 1,000 pages featuring Biographies and Stories. [He stopped updating them in 2008](#).

Updated MAD Pages



Don King



Asamoah Nkwanta



John Weaver

The screenshot shows the updated version of the MAD Pages website. It features a header with the title "MATHAD: THE MATHEMATICIANS OF THE AFRICAN DIASPORA" and links to "Recent Events" (listing the 2019 NAM Meeting at Southern University) and "Featured Profiles" (showing four profiles: Morris Akao, Marjorie Lee Browne, Terence Edwards, and Edray Goins). The main content area displays a grid of profiles for various mathematicians.

<https://www.mathad.com/home>

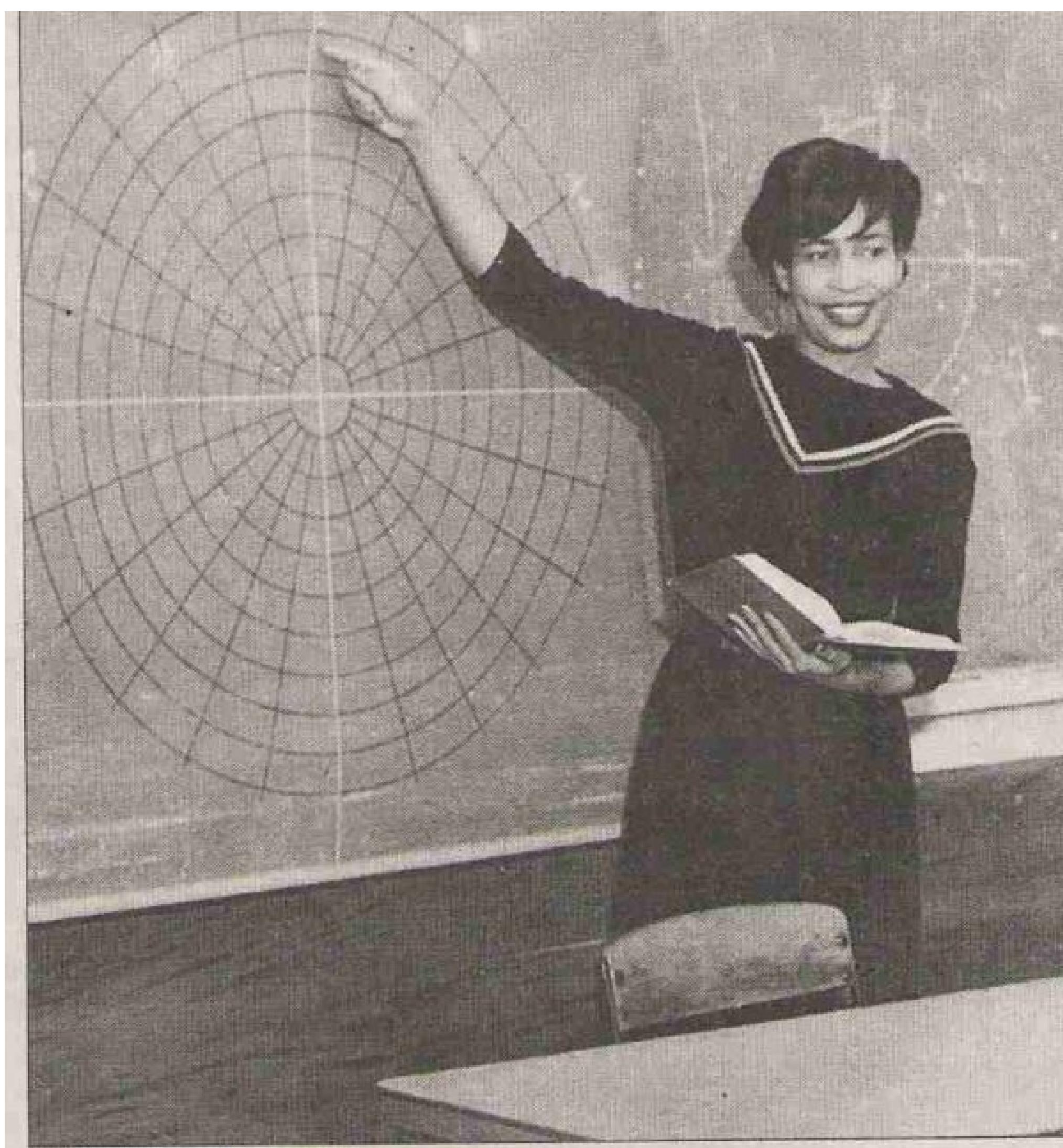
Goins, King, Nkwanta, and Weaver have been working since 2010 to update the Pages. [There are 800 names in the MAD Pages Database](#).

MAD Database's Ensemble of Researchers (MADDER)

Edray Goins (Pomona College) and Robin Wilson (Cal Poly Pomona) received funding from the Center for Undergraduate Research in Mathematics (CURM) to have students to participate in research assistantships for the academic year.

Goals

- ① **Researching and Writing Biographies** (2 hours a week)
Verify information in the biographical narrative, and interview individuals whenever possible.
- ② **Database Quality Control** (1 hour a week)
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Etta Zuber Falconer (1933 – 2002)

In 1969 she became the 10th African American woman to earn a Ph.D. in Mathematics (from Emory University) with an Algebra dissertation entitled "Quasi group Identities Invariant under Isotopy."

Motivation

Because of systemic barriers to education and academia, it was and continues to be incredibly difficult for Black women to enter the STEM fields. The MADDER project aims to search for and document the brilliance of Black women that has been undermined and unrecorded for centuries.

Our list of Black women in Mathematics begins in 1943 with Martha Euphemia Lofton Haynes. She is said to be the first Black woman awarded a Ph.D. in mathematics. While doing this work, we must remain committed to the fact that Black women's involvement in mathematics predates 1943 and the documented history of Black women in mathematics is incomplete. Despite the fragmentary nature of the archives, the contributions of Black female mathematicians provide a dense history of progress and excellence. As STEM fields grow and become increasingly diverse and accepting of marginalized communities, it is important that we say the names of those who paved the way for mathematicians and academics of all backgrounds. We can be certain that all of the women we have documented in our list have faced some form of adversity or injustice in their academic pursuits and beyond. We honor the Black women who were not famous and who did not get movies made about them. We honor the Black women whose names we have not found, and those whose contributions to the field would be ignored or rewritten due to hate and injustice.

From rocket science to resistance, these stories deserve to be told, but first we must find their names.

Limitations

- We were able to get stories for different women that obtained their PhD in mathematics but their names were often anonymized since they were participants of qualitative research.
- Another limitation was the size of the population. Black women are a marginalized group in mathematical academia, and searching for information about their personal lives and academic journeys required reaching out to current faculty and Black women mathematicians for their stories and help on finding others.
- Not many PhD granting institutions that we contacted kept records on the number of African American women that have earned PhDs from their Mathematics Departments.
- Due to IRB regulations, some of the outreach and mentorship programs that we contacted were not able to share their data on the Black women PhDs that they have supported.

Black Women with PhDs in Math (Incomplete)

Name	Year of PhD	PhD Granting Institution
Martha Euphemia Lofton Haynes	1943	Catholic University
Marjorie Lee Browne	1949	University of Michigan
Evelyn Boyd Granville	1949	Yale University
Gloria Conyers Hewitt	1962	Univ. of Washington
Argelia Velez-Rodriguez	1960	University of Havana
Sadie Gasawat	1961	-
Georgia Caldwell Smith	1961	University of Pittsburgh
Thyra Frazier Svager	1965	Ohio State University
Vivienne Malone-Mayes	1966	University of Texas
Eleanor Dawley Jones	1966	Syracuse University
Shirley Mathis McBay	1966	University of Georgia
Geraldine Darden	1967	Syracuse University
Annie Garraway	1967	University of California at Berkeley
(Mary) Lovenia DeConge Watson	1968	St. Louis University
Ann Marie Meyers Pelot	1968	Georgetown University
Etta Zuber Falconer	1969	Emory University
Gloria Ford Gilmer	-	Marquette University
Dolores Richard Spikes	1971	Louisiana State University
Rada Higgins McCreadie	1974	Ohio State University
Elayne Arrington-Idowu	1974	University of Cincinnati
Evelyn Patterson Scott	1974	Wayne State University
Fern Y. Hunt	1978	New York University
Karolyn Anne Morgan	1978	-
Fannie Ruth Gee	1979	University of Pittsburgh
Emma R. Fenceroy	1979	-
Frances Sullivan	1980	City University of New York
Suzanne Craig	1980	University of Southern California
Sylvia Bozeman	1980	Emory University

Methods

While working as a group under our advisor Dr. Robin Wilson we were tasked with creating a detailed list about African American women who earned their PhD from 1943 to the current year. Our goal was to create a current list of Black female Mathematicians who earned their PhDs. We began this process by searching through journals, newsletters, and articles on the internet, reaching out to other colleges and universities for information, and cross-referencing other available lists to ours. Some of the available resources we used were Wikipedia, the Mathematicians of the African Diaspora Website [5], the NAM Newsletter Archives, a journal called "An Unlikely Cohort Disrupting the Stereotypes about Mathematicians and their Careers", and doing literature searches for Black Women in Mathematics using JSTOR and Google Scholar.

We attempted to identify the year each person was born, where they were born, the college they went to that awarded them their PhD, the year they earned their degree, the college they did their undergraduate degree and the year they finished, any research or publications they worked on, mentors, what they worked after graduation, when they died, and anything else that was interesting about the person. We met weekly during the semester to discuss our findings.



Trachette Levon Jackson

received her Ph.D. from the University of Washington in 1998, and studies the mathematics of angiogenesis. She was selected as a fellow of the Association for Women in Mathematics (AWM) in the inaugural class in 2017.

Goal

To find the complete list of Black women who have earned Ph.D.s in mathematics.

MADDER Research Subgroups

- Subgroup #1: **Black Women in Mathematics**
Natasha Arnold, Tianna Couch, Brandon Douglas, Tadius Frank, and Christina Marsh; led by Robin Wilson
[Who are the first African American Women to earn PhDs in Math?](#)
- Subgroup #2: **Black PhDs in Mathematics from 2000 - Present**
Dante Christian, Virgil Munyemana, and Erin Sewell; led by Edray Goins
[Who are the recent African Americans to receive PhDs in the Math?](#)
- Subgroup #3: **Numbers of Black PhDs in Mathematics**
Daniel Agbeo, Kamil English, Reia Li, and Devon Woodfine; led by Goins
[What are the numbers of African Americans to receive PhDs in Math?](#)

Future Work

- We hope to continue to work with institutions to uncover Black women whose PhD work has gone historically undocumented and unnoticed to work closer to compiling a complete list.
- In the future, we hope to be able to add these names to the MAD pages and create biographies to document these women's accomplishments.
- We hope that the current data we have collected can be utilized to enrich other databases, to better educational opportunities for Black women, and to diversify academia and representation in math education.
- We hope to involve more current Black women mathematicians in the data collection process for recommendations to other Black math faculty and spread awareness about the project.
- We hope to extend the MAD pages to a social media platform to target younger audiences to empower and inform young Black students and faculty in STEM.

References

- [1] Taryn Butler Lewis, Tasha R. Inniss, Monica Jackson, and Calandra Tate Moore. *An Unlikely Cohort: Disrupting the Stereotypes about Mathematicians and their Careers*. <https://dx.doi.org/10.1090/noti2431>
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- [4] List of African American Mathematicians. https://en.wikipedia.org/wiki/List_of_African-American_mathematicians
- [5] Mathematicians of the African Diaspora (MAD Pages). <http://www.math.buffalo.edu/mad/>
- [6] Mathematics Genealogy Project. <https://genealogy.math.ndsu.nodak.edu>
- [7] National Center for Science and Engineering Statistics (NCSES). <https://ncsesdata.nsf.gov/home>

Acknowledgements

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- National Science Foundation (DMS-1722563)

Modern Magic: Black Math PhDs from 2000 to Present

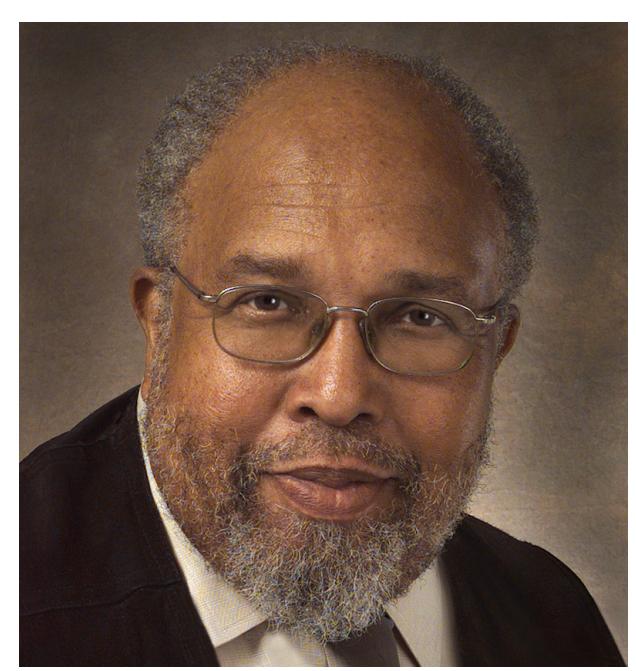
Dante Christian (Pomona College), Virgil Munyemana (Pomona College),
 and Erin Sewell (Cal Poly Pomona)

MADDER: Mathematicians of the African Diaspora Database's Ensemble of Researchers

Abstract

A group of undergraduate researchers under the supervision of Dr. Edray Goins (Pomona College) and Dr. Robin Wilson (Cal Poly Pomona) have undertaken Scott Williams' original project to highlight mathematicians of the African Diaspora and are currently expanding that same database. One subgroup, in particular, is focusing on uncovering the names of those with Ph.D.s in Mathematics from the year 2000 to the present day. This poster highlights their process, key findings, and overall takeaways from the project.

Mathematicians of the African Diaspora (MAD Pages)



Scott W. Williams

Williams introduced the site in 1997. There are more than 1,000 pages featuring Biographies and Stories. [He stopped updating them in 2008](#).

Updated MAD Pages



Don King



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John Weaver

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Inspiration for Research

The overarching inspiration for the MAD project is to showcase Black visibility in avenues other than entertainment. While those types of careers are certainly valid, this work can hopefully show that another path is possible for Black youth. In particular, we highlight mathematics to challenge racial notions that Black people cannot succeed in this field.

The inspiration for this specific portion of the project comes from the fact that Dr. Williams stopped updating the MAD pages [10] in 2008. Thus, how many PhDs have there been since then? As a measure of quality control, we decided to start from the year 2000 in hopes that we could uncover new names in the process.

Roadblocks

Throughout our search for names, a number of roadblocks arose. Starting with the Wikipedia page, we found that the majority of the people it had listed either received their PhD before 2000 or did not receive a PhD in our outlined area of study. With using social media, we found private accounts and private groups to be an issue due to lack of access. We also found our ability to verify the year and earned degree to be a recurring roadblock that could not always be fixed by using The Mathematics Genealogy Project [12]. We are still working on finding a concrete method of verifying that we have collected all the names for each year.

Takeaways and Next steps

We wanted our research to call attention to the ability that Black people possess to achieve great heights, despite the prejudices of society. We need to celebrate and acknowledge the world advancements of these 162 PhD recipients starting from the year 2000. That said, our MADDER research is doing just that for Black Math PhDs. In the future, we hope to intensify our efforts for seeking the names of Black PhDs through attending more mathematical colloquiums, sending out more emails to institutions and recipients themselves, and circulating a google form for people to provide any information on possible recipients. Once we gain more knowledge on such persons, we will have the potential to augment our amount of biographical synthesis. We will then be able to add such text to our website, <https://www.mathad.com/home>, for the world to see.

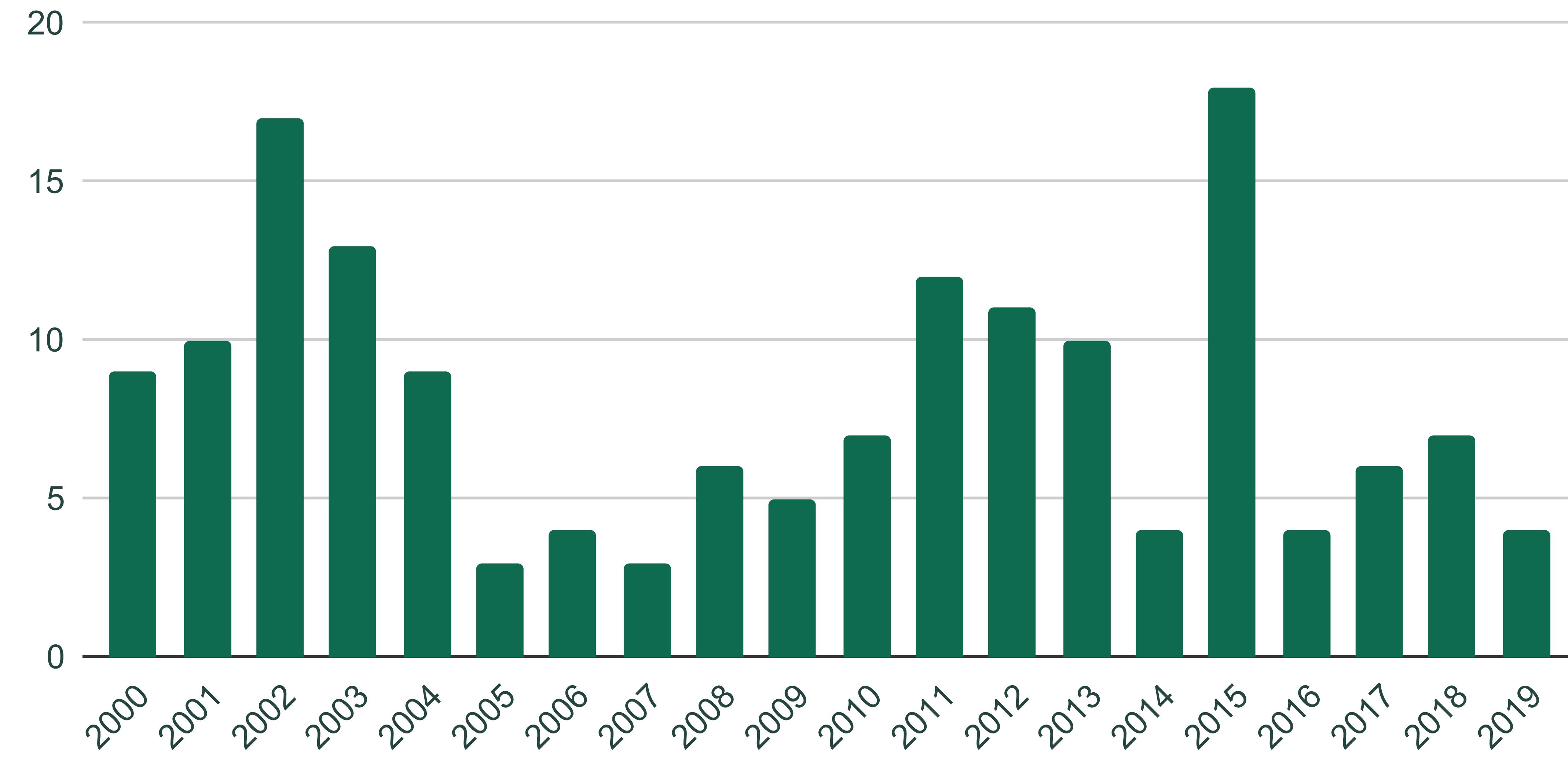
Main Research Question

What are the names of all the Black mathematicians who received their PhD from a U.S. institution between the years 2000 — 2022?

Methodology

- Before we could begin our list, we had to decide who to include. As said before, we focused on Ph.D.s from the 2000's onwards. We eventually decided that we will only record those who pursued their Ph.D. in Mathematics, rather than related degrees like Applied Math, Math Education, etc.
- We began our Google spreadsheet of names by collecting names from the Wikipedia page entitled "List of African-American mathematicians" [9].
- We then moved on to use social media as an additional tool to look for more recent graduates. In particular, Instagram was helpful, as it led us to the page "Mathematically Gifted and Black" [11], which also highlights Black mathematicians.
- We filtered through the lists of speakers from conferences like the Conference for African American Research in Mathematical Science (CAARMS) [7] and NAM's Haynes-Granville-Browne Session of Presentations by Recent Doctoral Recipients [8] to find those who have received a PhD. We also used publications from or about these conferences, such as the NAM Newsletter or university websites, as an additional source of names.
- In some occurrences, we would find names, but were unable to verify the year they were awarded their Ph.D. We would then find their profile on the Math Genealogy Project [11] to determine this.
- We cross-referenced our information with the profiles on the MAD Pages to verify whether the names we recorded were already in the database. If they were, we simply linked their profile on the Google sheet. If not, we made note of it for future entry.
- Overall, we spent 4 hours bi-weekly searching for names to add into our spreadsheet.

Number of Discovered Black Math PhDs per Year



MADDER Research Subgroups

- Subgroup #1: **Black Women in Mathematics**
 Natasha Arnold, Tianna Couch, Brandon Douglas, Tadius Frank, and Christina Marsh; led by Robin Wilson
 - Who are the first African American Women to earn PhDs in Math?**
- Subgroup #2: **Black PhDs in Mathematics from 2000 - Present**
 Dante Christian, Virgil Munyemana, and Erin Sewell; led by Edray Goins
 - Who are the recent African Americans to receive PhDs in the Math?**
- Subgroup #3: **Numbers of Black PhDs in Mathematics**
 Daniel Agbeo, Kamil English, Reia Li, and Devon Woodfine; led by Goins
 - What are the numbers of African Americans to receive PhDs in Math?**

References

- [1] Amy Harmon. *For a Black Mathematician What It's Like to be the Only One*.
<https://www.nytimes.com/2019/02/18/us/edray-goins-black-mathematicians.html>
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<https://dx.doi.org/10.1090/noti2431>
- [4] Rya Jetha. *Pomona and Cal Poly students team up to document Black contributions to mathematics*.
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- [5] Patricia C. Kenschaft. *Black Women in Mathematics in the United States*.
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Filling the Gaps: Numbers of Black PhD recipients in Mathematics

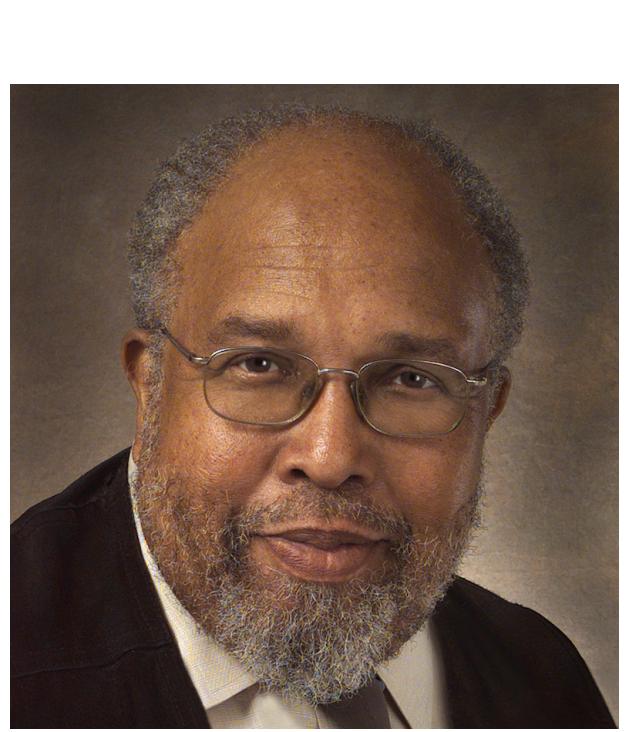
Daniel Agbeo (Pomona College), Kamil English (Pomona College),
 Reia Li (Pomona College), and Devon Woodfine (Cal Poly Pomona)

MADDER: Mathematicians of the African Diaspora Database's Ensemble of Researchers

Abstract

We set out to count the number of Black PhD recipients of a doctoral degree in mathematics from a US institution because no one has ever compiled a comprehensive list. In 1925, Elbert Frank Cox was the first Black person to receive a PhD in mathematics. Our research begins with Cox and goes all the way to the present day. We scoured university websites, the Math Genealogy Project, Wikipedia, and the archived Mathematicians of the African Diaspora website in order to begin making our list. We want future researchers to access a central location for this information. Black mathematicians are made invisible by time and we want the crucial work of existing Black mathematicians to be recognized.

Mathematicians of the African Diaspora (MAD Pages)



Scott W. Williams

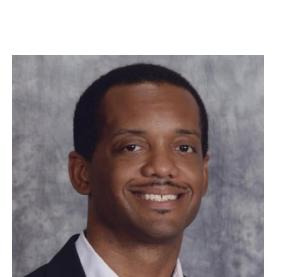
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Updated MAD Pages



Don King

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John Weaver

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Goins, King, Nkwanta, and Weaver have been working since 2010 to update the Pages. [There are 800 names in the MAD Pages Database](#).

Timeline of MAD Pages

1997	2015	2021
<ul style="list-style-type: none"> Scott Williams (SUNY Buffalo) finds the website "Mathematicians of the African Diaspora." The MAD pages feature over 700 African American scholars and scientists in math, computer science, and physics. 	<ul style="list-style-type: none"> Edray Goins (Pomona College), Donald King (Northeastern University), Asamoah Nkwanta (Morgan State University), and Weaver (Varsity Software) begin working to update the MAD pages. 	<ul style="list-style-type: none"> Edray Goins and Robin Wilson (Cal Poly Pomona) led a research group of 13 undergraduates during the 2021-22 academic year to write biographies for the new MAD Pages called MADDER: Mathematicians of the African Diaspora's Ensemble of Researchers

Our Question

Our subgroup within MADDER is trying to answer one seemingly simple question: [How many Black recipients of a doctorate in mathematics from a US institution are there?](#)

Process

- We started by looking at the information provided in the Wikipedia site: "List of African-American mathematicians" (1925-1975). We kept count of how many men and women earned a PhD in mathematics each year and input the numbers into a Google spreadsheet.
- Next, we looked at the corresponding years from MAD pages and input the names and numbers into the spreadsheet.
- We researched any discrepancies between the Wikipedia and MAD pages to find what information either database was missing.
- We were unable to filter information before 1948 on MAD Pages so further research can be done to verify the data.
- To continue our research for 1981 to present, we used the NCSES Database (see section below). We used a filter feature on the website to separate by men, women and year. We input these numbers into the spreadsheet.
- To cover the gap from 1976 to 1980, we used MAD Pages.
- We are still searching for other sources for cross referencing and confirming the data.

NCSES

To gather information on the number of PhD recipients to Black Mathematicians, we used the National Center for Science and Engineering Statistics (NCSES) Survey of Earned Doctorates. Going as far back as 1981 to present, the NCSES has built in parameters that can filter out degree level, major, race, ethnicity, sex, and years to build charts or tables with. For this study, our focus is on Black men and women who have earned doctoral degrees for Mathematics and Applied Mathematics. Unfortunately, the NCSES does not have demographical information such as ethnicity, race, gender, or sexual orientation pre-1980.

Motivating Questions

Where do we find the data?

Wikipedia [4], the original MAD Pages [5], Math Genealogy [6], and the NCSES Survey of Earned Doctorates [7].

How do we know the Wikipedia list is complete?

We don't. For example, some of the people who are listed on the MAD pages as having a PhD in math are listed on Wikipedia as having a PhD in mathematics education. This is why we are in the process of manually verifying all of the names in Wikipedia with the original MAD pages, the Math Genealogy Project, and university websites.

Are there more ways we can find data?

Email Mathematics Departments.

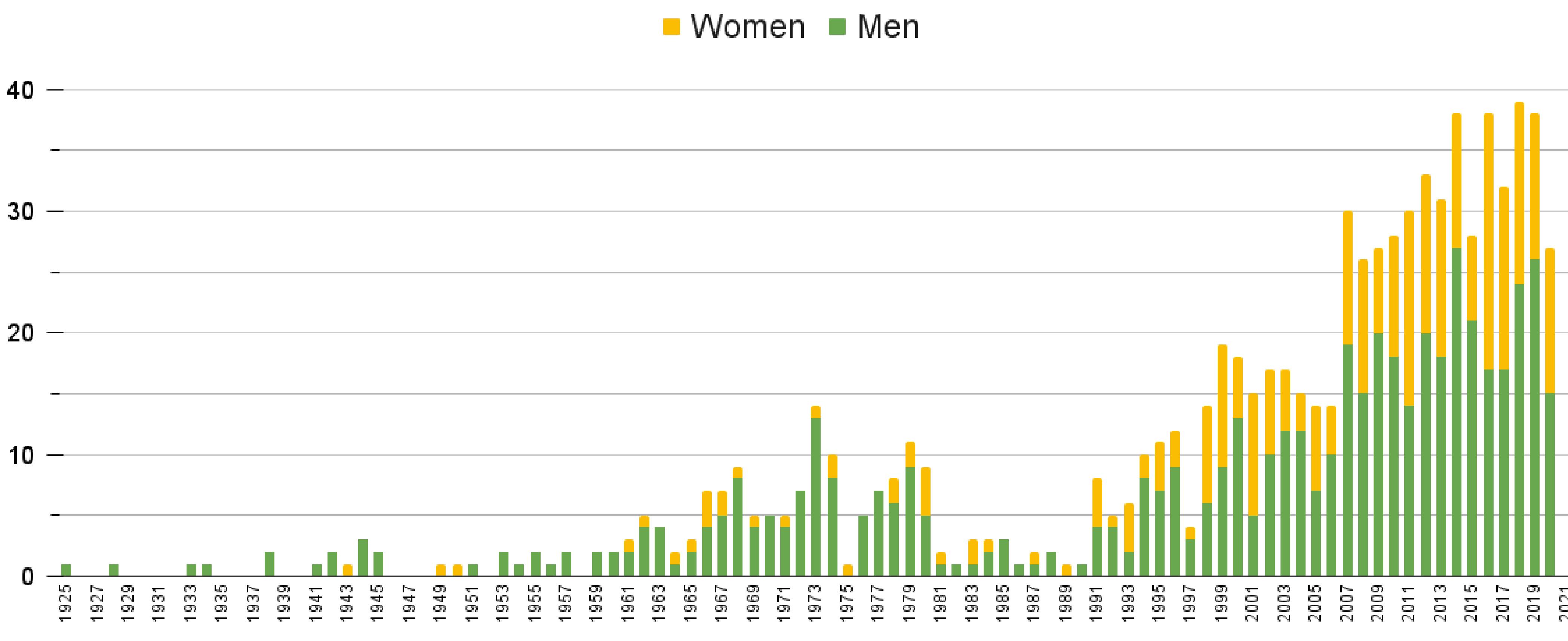
Where do we find complete data before 1980?

The NCSES Survey of Earned Doctorates did not record data about race or gender pre-1980. So we have to compile data from 1925-1980 from Wikipedia's List of African American Mathematicians, the Math Genealogy Project, and university websites.

Next Steps for Verifying Data

- From 1980 onward, we only have numbers of Black PhD recipients because that is the year that the NCSES Survey of Earned Doctorates began keeping track of ethnicity. We need to add names to these numbers so that we can verify them with the MAD Pages.
- We are still in the process of checking all the data. For each year, we are going through and manually checking to see if the names in Wikipedia's List of African-American Mathematicians aligns with the names in the MAD Pages. We are also trying to find a third source of information to confirm the number and year of the PhD recipients. Examples of this third source include the information directly from a university website or from the Math Genealogy Project, which records data about mathematical researchers.
- Verification is important because of some issues we've encountered. For example, there are mathematicians in the MAD pages who are not in the Wikipedia list and vice versa.

Number of Black Men and Women who Received a PhD in Mathematics in the US



MAD Database's Ensemble of Researchers (MADDER)

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References

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